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sample, spores of different sizes were found congregated in countless numbers and in various orders of distribution throughout the surfaces of the vegetable tissues. The majority of these spores were excessively minute, spherical, of the average diameter of the 1–20,000th part of an English inch, and required necessarily the employment of the highest powers of the compound microscope for the correct registration of their characteristic form and size. Sometimes these spores were to be observed collected in definite spherical heaps, but more often they were scattered in irregular-shaped patches, such patches being often again more or less confluent, and thus forming collections of considerable extent. A large number of these spores were likewise to be seen, detached from their original adhesions, freely floating in the water or collected in masses upon the peripheries of the small air bubbles that had here and there become entangled between the slide and covering glass. In this latter instance the spores exhibited a thicker and more opaque bounding wall, and manifested, as in the case of lycopodium powder, the power of resisting for some time the hydrostatic or wetting action of the water: this property had already been suspected by Prof. Tyndall to be possessed by these minute bodies, but had not previously been practically demonstrated.

"The hay within from four to six hours after maceration revealed on examination of a small fragment, a considerable alteration in the character and comportment of the associated spores. Hitherto these had displayed no signs of motion, a uniform stillness reigning throughout the entire expanse of the microscopic field. Now, however, among the numbers that had become detached from their original adhesion to the vegetable matter, the majority exhibited an active vibratory motion that at first sight was scarcely to be distinguished from the characteristic 'Brownian movements.' The size of these motile spores corresponded with that of the quiescent ones, not exceeding the 1–20,000th of an inch in diameter, and without recourse to the highest magnifying power and the most careful adjustment of the illumination, it was not found possible to ascertain by what means their locomotion was accomplished. Examined successively with the $\frac{1}{16}$, $\frac{1}{25}$ and $\frac{1}{50}$ inch objectives of Messrs. Powell and Lealand, it was at length satisfactorily determined that each individual spore or body was furnished with a single, long, slender, whip-like organ or flagellum, whose active vibrations propelled the spherical body through the water. These minute motile corpuscles exhibited, in fact, at this early stage of their development a type of organization in all ways comparable with that of the simply uniflagellate genus Monas."

PACKARD'S ZOOLOGY, SECOND EDITION.[1]—In revising this text book, the author has availed himself of the criticisms of other naturalists, and thus made a considerable number of changes in the stereotype plates. Several of the figures, notably that illustrating the anatomy of the cat, have been changed, and one of the opossum and its marsupial bone added. Other changes have been made in order to bring the book up to the present state of the science.

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[1] *Zoology for High Schools and Colleges.* By A. S. PACKARD, Jr. Second edition, revised. New York, Henry Holt & Co., 1880. 12mo, pp. 719. $3.00.

DAUBREE'S CHEMICAL GEOLOGY.[1]—This grand work may be regarded as a revised collected edition of the former smaller papers of M. Daubrée on experimental geology. It may be regarded as the great work of M. Daubrée's most laborious and successful scientific life, and on it he may safely rest his fame.

The first section of the work deals with chemical and physical phenomena—metalliferous deposits, nature of metamorphism, the effect of heated waters, formation of zeolites, amygdaloids, rocks both eruptive and metamorphic, and volcanic action.

The second section treats of mechanical phenomena, and applies the rigid experimental method of trituration and transportation of sediments, and chemical decompositions by mechanical forces; the distribution of gold in the bed of the Rhine is also discussed. The first chapter contains an account of the experiments on the striation of rocks. The marks or striæ are produced or imitated by rubbing pebbles together. The second chapter treats of the deformations which the earth's crust has been subjected to in former ways. Sir James Hall's experiments were of a similar character. The remarkable examples of reversed folds, as shown in the Alpine regions, are imitated and explained. The discussion of the nature and causes of faults, joints and all kinds of fractures in sedimentary rocks will be read by the geologist with peculiar interest. The account of the experiments on the heat developed by the crushing, grinding and mutual frictions of rocks are important; it is believed that sufficient heat may be generated in this way to produce metamorphism.

The second part treats altogether of cosmic bodies. Three hundred and fifty pages are devoted to the experimental study of the structure and genesis of meteorites and the accompanying minerals. The entire volume is well illustrated, and as a specimen of typography may be regarded as a model of clearness and beauty.—*F. V. H.*

HERTWIG'S CHÆTOGNATH WORMS.[2]—A careful elaboration of the morphology and development of the Sagitta, the type of the Chætognathi, that singular type of worms, so aberrant that it has

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[1] *Etudes Synthetiques de Geologie Experimentale.* Par A. Daubrée. Premiere partie—Application de la méthode experimentale a l'etude de divers phenoménes geologiques. Deuxieme partie—Application de la méthode experimentale a l'etude de divers phenoménes cosmologiques. Large 8vo, 828 pages.

[2] *Die Chætognathen. Ihre Anatomie, Systematik und Entwicklungeschichte.* Eine Monographie. Von Dr. OSCAR HERTWIG. Mit 6 Tafeln. Jena, 1880. 8vo, pp. 112.